A Common Infrastructure for


Scientific OpenStack - Digital Asset

Overview

- OpenStack Digital Asset for Research Computing being produced by Cambridge with StackHPC for the benefit of the IRIS Community

- Background Material from July F2F
  - *[Scientific OpenStack Presentation July 2018](#) and subsequent [Scientific OpenStack Proposal](#)*
  - *Significantly pared down from original proposal*
    - *[Cambridge November F2F](#)*
  - *Major Driver is by "user" engagement*

- Current Activities Work Packages
  - *[Scientific OpenStack Work Packages](#)*

- Future Work

Background
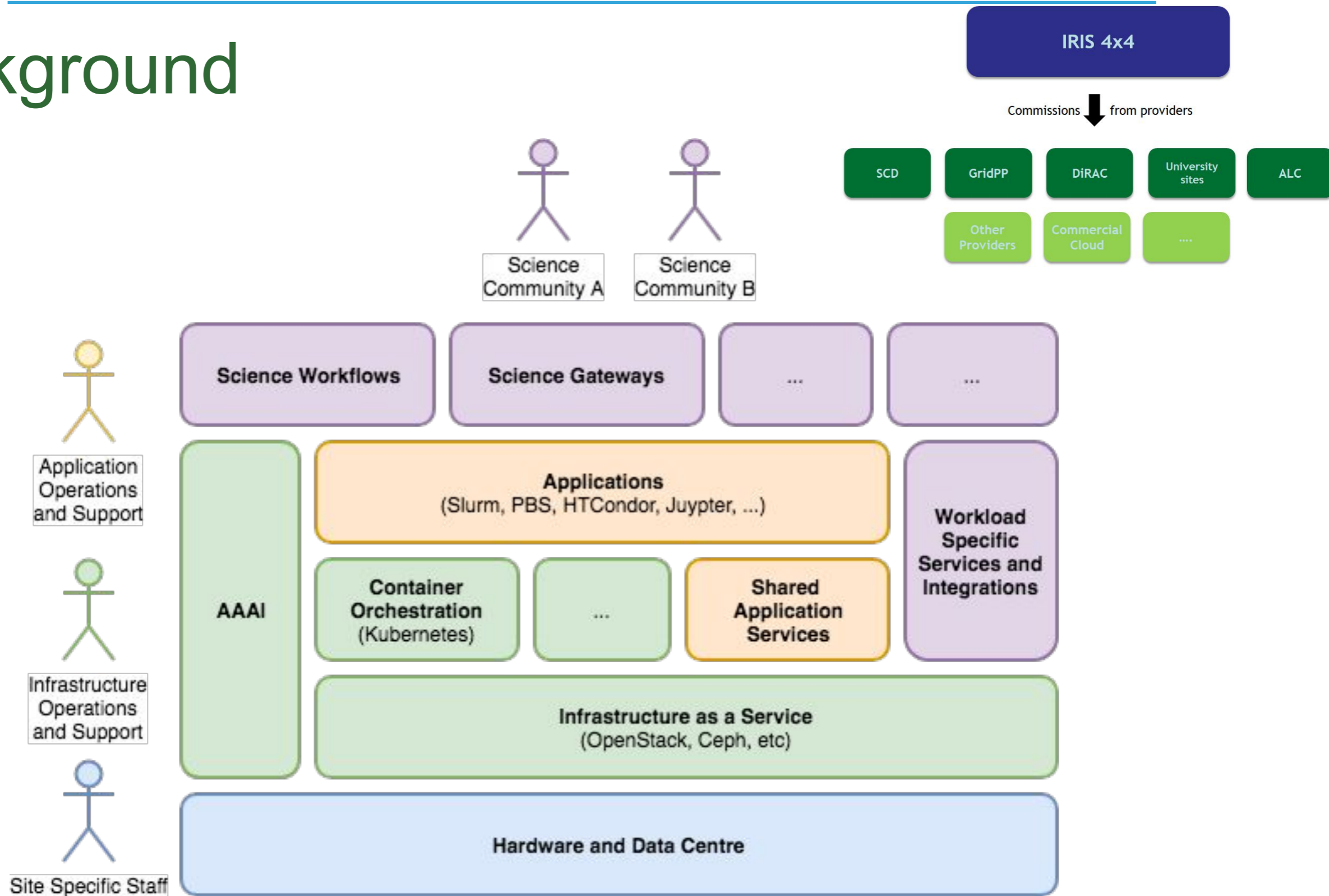
Work Packages

- **WP1** A preliminary reference architecture based around the IRIS baseline hardware will be provided with considerations around control plane and user workload networks. Builds on the Scientific OpenStack Kayobe Release developed as part of the SKA-SDP Prototyping AlaSKA system and also used for EUCLID support on the re-purposed hardware from the UoC.
- **WP2** Considers the necessary resources required to support Scientific OpenStack across the community providing development and support processes. A reference system will be explored.
- **WP3** Concerns itself with Federation activities and extends the work on AAI conducted for UKT0-2017 to harden LoA and incorporate accounting, from APEL, as well as exploring data federation and high-performance WAN needs.
- **WP4** Concerns itself with user-workload activities across the community and identifies particular platforms for both current (e.g. Vcycle) and emerging (SKA, CCFE, EUCLID) workloads. Consideration of workloads for Commercial Cloud.

Work Package 1

1	Create Reference Architecture	Development of a UK digital asset providing a common IaaS software layer based around reference architectures and a set of vendor agnostic conformance tests. This will incorporate Virt, Bare-Metal and Container Orchestration and be a component within the IRIS Community Cloud.

- ▸ Delivered Specs for Scientific OpenStack
  - ▸ *Available at Scientific OpenStack Tech Docs*
  - ▸ *Covers Hardware Specification at Cambridge using containerised OpenStack Deployment*
  - ▸ *Covers configuration of OpenStack Monasca as Monitoring and Logging Service*
  - ▸ *Detailed Ansible Repositories*
  - ▸ *Based on feedback from extensive testing of EUCLID SlurmAAS*
- ▸ Conformance Testing
  - ▸ *Moved to WP2*
- ▸ *OpenStack Scientific SIG*

Work Package 2

2	Create Support Infrastructure	This will be developed by the IRIS community within the context of upstream OpenStack foundation releases and constellations, and therefore not suffer from stale "forks" of the software which create impediments and friction, and will be community-supported by STFC academia providing cost-effective mechanisms for roll-out.

- ▸ *Rundeck to assist Change Management*
  - ▸ *Established a pre-production environment pattern, to assist with roll-outs*
  - ▸ *Regular Rally conformance test runs on production, including benchmarking*
- ▸ *Automated Application Stack deployment*
  - ▸ *with pre-production style testing of customizations*
- ▸ Scientific OpenStack Hack-a-thon
  - ▸ *Edinburgh, Manchester and Cambridge (more welcome)*
- ▸

Work Package 3

3	Federation Activities	These activities extend the base Scientific OpenStack release to embrace federated activities to ensure that all IRIS infrastructure can be utilized

- ▸ Prototyped usage reporting to APEL (fallback on quotas to limit usage)
  - ▸ *Stretch: APEL VM benchmark*
- ▸ Experimental software VPN between regions (with RAL)
  - ▸ *Initial Discussions with JISC on dedicated VPN similar to Chameleon*
- ▸ AAAI
  - ▸ *Experimental Local Keycloak+FreeIPA for authorization, communicating with EGI Check-In (probably dev instance)*
- ▸ Multi-Cloud Deployments in Progress
- ▸ Federated Ceph using Keystone for RADOS-GW

Work Package 4

4.1	Scientific OpenStack Roll-Out	Roll-out on latest hardware at nominated IRIS sites encapsulating WP 1-3, where hardware is already supported by Kayobe. Engagement with IRIS sites on common use modes for access to IRIS sites.

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- Euclid - Multi-Region Slurm AAS
- Engaged with LSST Jupyter Notebooks atop of Kubernetes
  - *Incorporating OpenStack Magnum*
  - *RAL and Cambridge AlaSKA system*
- Preliminary Discussion with Manchester on Vcycle Backfill
- Stretch Goal: "give-me-a-box" portal

Future Work

▸ Under the Aegis of Scientific OpenStack Steering Ctte.

▸ "End-User"-driven

  ▸ *HTCondor with hyperconverged parallel filesystem,a la Euclid-style SlurmAAS*
  ▸ *Portal for "get me a box" and "get me a stack"*
  ▸ *Federation linked user onboarding into above stacks (web app tied to AAI system)*
  ▸ *Secure OpenStack (Diamond, Cambridge)*
  ▸ *Further engagement with instruments SKA Regional Centres, LIGO, need a prioritised list?*
  ▸ *Hardware-assist VPN for power users.*

▸ Process Driven

  ▸ *Scientific OpenStack Support*
  ▸ *APEL Integration*
  ▸ *Pre-emptible instances*
  ▸ *Extend CICD*
  ▸ *Formalise Scientific OpenStack Portal within IRIS*
  ▸ *Public Cloud Integration*